## Instruction:

The **LDA instruction** will now load the value **7** from memory location 1010 into the accumulator (reg_A).

Program :

1: LDA 10 ; Load the value stored at memory location 1010 (which will be 7)

### Memory Map:

We will store the number 7 in memory location 1010 so that LDA 10 can load it into the accumulator.

### Programming Steps for LDA 10 (with value 7):

## Initialization:

1. Turn on u_mode pin.
2. Turn on debug pin.
3. Pulse the pc_reset pin to reset the program counter.

**Step-by-Step for LDA 10:**
Store Data (0000 0111) to Memory Location 1010 (Data for LDA 10):

1. Set debug_data to 0000 1010 (this is the memory address where the data 7 will be stored).
    - Address 1010 is where the data 7 will be located.
2. Toggle mar_in_en and give a clock pulse.
3. Turn off mar_in_en.
4. Set debug_data to 0000 0111 (this is the value 7 in binary).
    - 0000 0111 is the value we are storing in memory location 1010.
5. Toggle sram_wr and give a clock pulse.
6. Turn off sram_wr and observe the data saved at memory location 1010.
    - This ensures that the value 7 is correctly stored at memory location 1010.

Finalizing the Programming:

1. Turn off debug pin.
2. Turn off u_mode pin.

## Execution Phase:

Now that the program is loaded into memory, you can execute it.

Fetch, Decode, Execute Cycle for LDA 10:

1. Pulse the pc_reset pin to reset the Program Counter.
2. Turn on the o_mode pin to start the output mode.

Now, give clock pulses and observe the following:

- T1:
  - pc_out_en (PC value will be sent to the bus).
  - mar_in_en (The value on the bus will be written into the MAR, which is 0000 because it's the first instruction).
- T2:
  - sram_rd (Read the instruction stored in memory at address 0000).
  - ins_reg_in_en (The instruction is loaded into the instruction register, which is 0001 1010).
- T3:
  - pc_en (Increment the program counter to point to the next instruction).
- T4:
  - ins_reg_out_en, mar_in_en (The address 1010 from the instruction will be placed into the MAR).
- T5:
  - sram_rd, a_in (The value stored at address 1010—which is 7—will be loaded into the accumulator reg_A).
- T6:
  - The value 7 is now in reg_A.

# Timing Logic for LDA 10 (Value 7):

| **T-state LDA(0001)** | **T-state LDA(0001)** |
|---|---|
| **T1** | Pc_out,<br>Mar_in_en |
| **T2** | Sram_rd, Ins_reg_in_en |
| **T3** | Pc_en |
| **T4** | Ins_reg_out_en, Mar_in_en |
| **T5** | Sram_rd, A_in |
| **T6** | Don't care |

This completes the execution of the **LDA 10** instruction, loading the value **7** from memory location 1010 into the accumulator (reg_A).